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**TRANSMITTAL  
FORM**

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Total Number of Pages in This Submission

7

Application Number

10625,340

Filing Date

07/22/2003

First Named Inventor

HEIN, GERALD K.

Art Unit

3753

Examiner Name

McKINNON, Terrell L.

Attorney Docket Number

1444-0096

**ENCLOSURES (Check all that apply)**☐

Fee Transmittal Form

☐

Fee Attached

☒

Amendment/Reply

☒

After Final

☐

Affidavits/declaration(s)

☐

Extension of Time Request

☐

Express Abandonment Request

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Information Disclosure Statement

☐

Certified Copy of Priority Document(s)

☐Reply to Missing Parts/  
Incomplete Application☐Reply to Missing Parts  
under 37 CFR 1.52 or 1.53☐

Drawing(s)

☐

Licensing-related Papers

☐

Petition

☐Petition to Convert to a  
Provisional Application☐Power of Attorney, Revocation  
Change of Correspondence Address☐

Terminal Disclaimer

☐

Request for Refund

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Remarks

☐

After Allowance Communication to TC

☐Appeal Communication to Board  
of Appeals and Interferences☐Appeal Communication to TC  
(Appeal Notice, Brief, Reply Brief)☐

Proprietary Information

☐

Status Letter

☒Other Enclosure(s) (please identify  
below):

Return Receipt Postcard MPEP 503(A)

**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**

Firm Name

Cook, Alex, McFarron, Manzo, Cummings &amp; Mehler, Ltd.

Signature

Printed name

David M. Mundt

Date

May 22, 2006

Reg. No.

41,207

**CERTIFICATE OF TRANSMISSION/MAILING**

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Kim Canchola

Date

May 22, 2006

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No. : 10/625,340

Confirmation No. : 8601

Inventor : Gerald K. Hein

Filed : 07/22/2003

TC/A.U. : 3753

Examiner : Terrell L. McKinnon

Title : A SYSTEM FOR RELIABLY REMOVING HEAT FROM A  
SEMICONDUCTOR JUNCTION

Docket No. : 1444-0096

The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service, with proper postage prepaid on May 22, 2006 in an envelope addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

By:

*Kim Canchola*  
Kim Canchola

Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**REPLY UNDER 37 CFR 1.111**

Sir:

In reply to the Final Office Action of March 22, 2006, please amend the above-identified application as reflected in the amendments to the claims on the following page:

## **AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (Previously Presented) A system for removing heat from a semiconductor integrated circuit in electronic equipment, comprising:

a heat sink member attached to a semiconductor integrated circuit which is part of an integrated circuit board assembly; and

a mounting member connected to or part of a chassis portion of the electronic equipment and an attachment member positioned on the mounting member for receiving and releasing the heat sink, wherein when the heat sink is received by the attachment member, the heat sink directly engages both the integrated circuit board assembly and the mounting member to establish a low thermal resistance path from the integrated circuit to the mounting member, permitting heat to be conveniently removed from the integrated circuit.

2. (Previously Presented) The system of claim 1, wherein the attachment member is a spring clip having two opposing inwardly directed end portions for holding the heat sink.

3. (Original) The system of claim 2, wherein the mounting member includes two spaced opposed openings through which the end portions of the clip extend, and wherein the spring clip has a central portion which is on the opposite side of the mounting member from the two end portions when the spring clip is operatively positioned on the mounting member.

4. (Original) The system of claim 3, wherein the heat sink comprises two flange portions joined together by an intermediate portion of less cross-sectional area than the flange portions, such that one of the flange portions can be moved into firm engagement between the end portions of the clip and the adjacent surface of the mounting member.

5. (Original) The system of claim 1, wherein the heat sink is permanently attached to the integrated circuit on the integrated circuit board assembly.

6. (Original) The system of claim 1, wherein the mounting member is insertable into the equipment chassis in a low thermal resistance relationship therewith.

7. (Original) The system of claim 1, wherein the mounting member comprises a part of the equipment chassis.
8. (Original) The system of claim 1, wherein the mounting member includes an embossed area on a surface thereof adjacent the end portions of the operatively positioned spring clip.
9. (Original) The system of claim 4, wherein the flange portions are circular and the intermediate portion is cylindrical.
10. (Original) The system of claim 4, wherein the flange portions are approximately square and are each larger than the intermediate portion, sufficient to permit the heat sink to be conveniently engaged by the end portions of the spring clips against the adjacent surface of the mounting member.
11. (Original) The system of claim 1, wherein the end portions each include corner parts which flare downwardly from the end portions.
12. (Original) The system of claim 8, wherein the embossed area includes a lubricant.
13. (Previously Presented) The system of claim 1, wherein when the heat sink is released from the attachment member, the attachment member remains engaged to the mounting member.
14. (Previously Presented) The system of claim 1, wherein the thermal resistance path permits heat to be removed from the integrated circuit by thermal conduction between the heat sink and the mounting member.
15. (Currently Amended) A method for removing heat from a semiconductor integrated circuit in electronic equipment, the method comprising the steps of:
  - engaging a heat sink member to the semiconductor integrated circuit which is part of an integrated circuit board assembly,
  - engaging a mounting member to part of a chassis portion of the electronic equipment, and
  - ~~forcing directly engaging the heat sink member with both the integrated circuit board assembly~~  
and to contact a mounting member using an attachment member to establish a low thermal resistance path from the integrated circuit to the mounting member, permitting heat to be removed from the integrated circuit.
16. (Canceled)
17. (Previously Presented) The method of claim 15, further comprising permanently attaching the heat sink member to the integrated circuit on the integrated circuit board assembly.

18. (Currently Amended) The method of claim 1[[6]]5, further comprising disengaging the heat sink member from the mounting member without disengaging the attachment member from the mounting member.

19. (Previously Presented) The method of claim 15, wherein the thermal resistance path permits heat to be removed from the integrated circuit by thermal conduction between the heat sink and the mounting member.

20. (New) A method for removing heat from a semiconductor integrated circuit in electronic equipment, the method comprising the steps of:

- engaging a heat sink member to the semiconductor integrated circuit which is part of an integrated circuit board assembly;

- engaging a mounting member to part of a chassis portion of the electronic equipment;

- directly engaging the heat sink member with both the integrated circuit board assembly and a mounting member to establish a low thermal resistance path from the integrated circuit to the mounting member, permitting heat to be removed from the integrated circuit;

- engaging the mounting member with an attachment member; and

- disengaging the heat sink member from the mounting member without disengaging the attachment member from the mounting member.

## **REMARKS**

Applicant has carefully reviewed and considered the Final Office Action of March 22, 2006, including the cited prior art. In response, Applicant has amended claim 15 to more particular point out and claim the disclosed invention. In addition, claim 18 has been amended to update its dependency, and claim 18, which was marked as allowable in the outstanding Office Action, has been rewritten in independent form as claim 20. In view of the amendments made, and the remarks which follow, Applicant believes all claims to be allowable, and respectfully requests issuance of a timely Notice of Allowance.

Claims 15-17 and 19 stand rejected under 35 U.S.C. § 102 as anticipated by Berg (USPN 4,447,842)(“the ‘842 patent”), Karpman (USPN 4,825,337)(“the ‘337 patent”), and Goebel (DE 199 25 983)(“the ‘983 patent”). The ‘842 patent discloses a heat sinking system whereby a semiconductor chip has a pair of heat exchange fins thermally coupled to it. Each fin projects through a groove and into a channel of cooling module intermediate a cooling surface of the cooling module. Applicant respectfully submits that the ‘842 patent does not disclose an attachment member coupled to the heat sink and mounting surface, and exerting a force on each, thereby forcing them into contact and creating a low impedance thermal path.

The ‘337 patent discloses heat sinking system using a variable thickness intermediate cooling member to couple a circuit board to a cold plate. The intermediate cooling member uses a handle to activate a mechanism to expand the board and create a tight thermal connection with the cold plate and the circuit board to be cooled. Applicant respectfully submits that the cooling system disclosed by the ‘337 patent is not suitable for use in cooling individual semiconductors, as is the system disclosed in the present invention. In addition, Applicant respectfully submits that the ‘337 patent does not disclose an attachment member that forces a heat sink into contact with a mounting member.


The '983 patent discloses a heat sink coupled to a semiconductor device and further coupled to a mounting device by a rivet. Applicant respectfully submits that the '983 patent does not disclose an attachment member that forces a heat sink into contact with a mounting member; rather, the disclosed rivet is merely a passive restraint.

### CONCLUSION

Applicant respectfully submits that in light of the amendments to claims and the argument set forth in this response, this application is now in condition for allowance, and respectfully requests that a timely Notice of Allowance be issued. However, should Examiner be of the opinion that further amendment or response is required; Applicant encourages Examiner to contact the undersigned attorney at the telephone number set forth below. Further, although no additional fees are believed to be due at this time, the Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Cook, Alex, McFarron, Manzo, Cummings & Mehler, Ltd., Deposit Account No. 50-1039 with reference to attorney docket number (1444-0096).

Respectfully submitted,

COOK, ALEX, McFARRON, MANZO,  
CUMMINGS & MEHLER, LTD.

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